Notes on Alternative Language to Be Utilized with 40 CFR Part 96
For Output-based Allocation of NO_x Emission Allowances
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NOTES ON ALTERNATIVE LANGUAGE TO BE UTILIZED WITH 40 CFR PART 96 FOR OUTPUT-BASED ALLOCATION OF NO_x EMISSION ALLOWANCES

There has been much discussion on the topic of output-based allocation of NO_x allowances under the cap and trade program proposed for the SIP call. Many sources and many states are interested in output-based allocation. Studies have indicated that output-based allocation will reduce compliance costs, non-ozone season NO_x emissions and emissions of other pollutants by encouraging the construction and increased use of lower and non-emitting sources and more efficient generators. Despite this interest, many states have been reluctant to pursue this option for at least two reasons:

- Concern that making changes to the proposed Part 96 trading rules will threaten the streamlined approval of their SIP
- Lack of information on the methodology of output-based allocation and lack of time to develop appropriate language for their SIP.

This package includes information intended to allay the fears on the first concern and provide regulatory language and data to address the second problem. This package is intended to allow states the option of considering output-based allocation in a timely and reasoned way as they develop their SIPs.

EPA Treatment of Allocation

The preamble to the SIP call specifically states in Section VII(E)(1) that states have the option of applying output-based allocation for Part 96 in their SIP rather than the default input-based methodology. The EPA has reiterated in meetings with the states that the states have the option of applying an output-based allocation methodology such as the one proposed here without risk to the streamlined approval of their rule. States with remaining concerns should contact the Acid Rain Division directly for information.

Implementation of Output-Based Allocation

Basic Concepts

An output-based allocation system does not change the number of allowances to be allocated. It only changes the way in which the allowances are allocated to individual sources. The primary source categories in the trading program to which the output-based system could be applied would be power generation and industrial boilers. The EPA has defined for each state a NO_x budget for power generation and for non-electric generation. Each state may modify this budget, but ultimately will have a budget for each category.

The output-based allocation approach simply says that each source receives a portion of the allowances proportional to its output. If a source generates 2 percent of the electricity generated in the state, it should receive 2 percent of the allowances budgeted for electric generators. Stated mathematically, this is:

$$\text{Allocation for Unit A} = \frac{\text{Generation Unit A}}{\text{Total State Generation}} * \text{State } NO_x \text{ Budget for Generators}$$

The same calculation would hold for non-electric generators based on the generation of steam or other thermal output. Cogeneration facilities which generate electricity and thermal output would receive allowances from each pool (thermal and electric) based on their proportional share of generation in each category. This can be calculated whether the industrial boiler allowances are done on input or output (see below).

The attached alternative language for Part 96 implements the allocation using a nominal output-based allocation rate for each unit (1.5 lb/MWh for electric generators and 0.2 $lb/mmBtu_{out}$ for non-electric generators). Each unit receives an allocation equal to its control season output times the appropriate rate. The allocations are then normalized to ensure that the total matches the pool of allowances available to be allocated. This is the same approach that is used in the heat-input allocation proposed by EPA. The nominal allocation rates are simply the heat-input values

proposed by EPA, converted to output using typical efficiency factors. The actual values do not matter in the end since they are normalized to the available pool, but using these values reduces the required adjustment.

While the methodology of output-based allocation is straightforward, there has been concern that acquiring the required data is problematic to the point of preventing the application of this approach. Proposed solutions to this problem are presented below.

Definition of Affected Sources

One of the identified benefits of output-based allocation is that it encourages the use of low and non-emitting electric generators by recognizing that electricity from any source is equally valuable and that switching to cleaner sources may be the lowest cost compliance option. Because the allocation is based on generation, all types of generators, including non-combustion source, can be included in the basic allocation equation. The choice of sources will not affect the total amount of tons to be allocated or reduced. Economic studies have suggested that allocating tons to all sources will reduce the total cost of compliance by increasing generation from low or non-emitting sources and reducing the amount of required retrofit control. The choice of which sources to include will be made by the states based on their own policy considerations.

The attached alternative language has been modified to include *all* forms of electric generation. States which wish to restrict the applicability to combustion units only or some other set of generation sources will have to adjust the definition of "unit" in section 96.2 accordingly.

Data Availability

There are data problems for some of the affected sources whether the allocation is based on either input *or* output. The EPA has committed to a process to provide better output data within the next few years. The only issue now is what are the best output data sources available for use during the next few years until the improved EPA data are available. However, adequate output data on the generation of electricity and thermal output are available to allocate allowances. The output generation data are more accurate than data that have been used in past allowance allocation processes and are as good as the heat-input data that would be used for non-utility sources.

Utility Electric Generators Data on generation by electric utility generators are collected by the Energy Information Administration through several data forms. Utilities provide the data and certify them to be correct. The primary data sources for allocation are from EIA Forms 767 and 759. Form 767 provides unit-by-unit data for monthly generation at steam-electric power plants. Form 759 provides monthly generation by fuel and prime mover and can be used to tabulate generation from non-combustion plants. An Excel data file accompanying these notes contains monthly generation data for the 1995 and 1996 ozone seasons for utility power plants in the 22 state SIP call region. These data can be used to calculate allocations for the plants that make up the bulk of the generation in the region. If fossil-fuel, non-steam utility generators are not included in either of these data sources, they may be treated like non-utility generators discussed below.

Non-Utility Generators EIA does collect generation data for non-utility generators. Although both heat input and generation data are currently confidential and not available, EIA is proposing both be made public. Until this data is publicly available, states have several options for these sources:

- Many states already collect information from these sources for regulatory purposes or could even require them to submit generation data for past ozone seasons as the basis for allocation. This is probably the most accurate approach and is essentially the same approach that many states would use for allocation based on heat input. The generation data are typically monitored by the sources for business and operational purposes.
- Where generation data are not available but heat input data are available, the generation can be estimated by multiplying the heat input times a typical heat rate for the specific plant type. EPA has suggested the heat rates shown in Table 1 for this type of calculation in its proposed FIP. States could choose other values if they have better data.
- Where no data are available at all, the EPA has proposed using forecast data from its IPM forecasts which are available from EPA.
- These same approaches could be used for utility sources for which other data sources are not available.

Table 1
Proposed Heat Rates for Calculating Electric Output

Unit and Fuel Type	*Generator size (MW)*	*Average Heat Rate (Btu/kWh)*
Combustion Turbine	<= 50	14,250
(gas or #2 fuel oil/diesel)	>50	13,200
Combined Cycle Turbine	<= 100	11,100
(gas or #2 fuel oil/diesel)	> 100	8,500
Oil- or Gas-fired	<= 400	10,600
Steam Boiler	> 400	10,000
Coal-fired Boiler	<= 500	10,400
	> 500	9,800

Cogeneration Facilities As noted above, allowances should be allocated to cogeneration facilities for both their electric and thermal output. This recognizes that the cogeneration facility functionally replaces two conventional facilities and may be categorized under either Sections 96.4(a)(1) or 96.4(a)(2). Each form of output is treated the same as any other facility of its type (electric or non-electric generating unit). The electric output for cogeneration facilities can be tabulated the same as other non-utility generators (see above). Many cogeneration facilities monitor and record thermal output and can report it to the states as they do electric output. In cases where the thermal output is not monitored, it can be calculated using a power-to-heat ratio. Table 2 lists typical power-to-heat ratios for cogeneration facilities. Specific facilities may have more accurate data which can be provided to the state.

Table 2

Recommended Power-to-Heat Ratios for Cogeneration Facilities

System Type	*Power-to-Heat Ratio*
Steam Turbine	0.2
Simple Cycle Combustion Turbine	0.5
Combined Cycle	1.0
I.C. Engine	1.75

Non-electric Generators There is unlikely to be much measured data available on thermal output of non-electric generators (industrial boilers). The most reasonable approach is for states to collect the best available heat input data and convert it to output using a standard efficiency factor such as 80 percent before applying the allocation factor. Since the same efficiency factor is applied to all the boilers, the initial allocation will be the same as if based on heat input. However, this approach allows the output-based allocation regulatory structure to be established in state SIPs and future allocations to be based on actual thermal output data or other data sources which result from the EPA stakeholder process. States also have the option of keeping the allocation to these units on an input basis. Although characterized as non-electric generators, this portion of the inventory includes cogeneration units with heat input greater than 250 mmBtu/hr and generating capacity less than 25 MWe.

Alternative Language for Part 96

The attached section comprises alternative language for the Part 96 Model Trading Rule which applies output-based allocation. Most of the changes apply to section 96.42 which directly addresses allocation. The primary changes are to base the allocation on output vs input and to address issues related to cogeneration units. There are also changes to some of the definitions in section 96.2 to change the focus from input to output. This version also broadens the applicability to all electric generators rather than combustion units only. The specific changes to Part 96 are discussed below.

Discussion and Summary of Changes:

§ 96.2 Definitions.

Definition of "*cogeneration unit*" added.

Definition of "c*ommence commercial operation*" modified to address all energy-producing facilities.

Definition of "*electric output*" added.

Definition of "*NOx Budget unit*" modified by deleting the words "emission limitations" so that term is not limited to heat input generation.

Definition of "*operating*" modified to reference electric output and thermal output.

Definition of "*output*" added.

Definition of "*thermal output*" added.

Definition of "*unit*" modified to add generation-neutral sources of electrical generation.

Definition of "unit load" modified to reference electric output and thermal output.

Definition of "*unit operating day*" modified to reference electric output and thermal output.

Definition of "*unit operating hour*"or "*hour of unit operation"* modified to reference electric output and thermal output.

Definition of "*utilization*" modified to reference electric output and thermal output.

§ 96.3 Measurements, Abbreviations, and Acronyms.

Acronym for MWh added.

§ 96.42 NOx Allowance Allocations.

Allocation of Allowances Using Output. Each NOx Budget unit receives a portion of the allowances that is proportional to its output without changing the state budgets in the final SIP Call. This section takes the allowance budget that a state received from EPA and allocates the budget to units within the state using a nominal output-based allocation rate: 1.5 lb/MWh for electric generators and 0.2 lb/mmBtu$_{out}$ for non-electric generators. Two conversions are made for the output-based allocation rates. The first converts 0.15 lb/mmBtu input to 1.5 lb/MWh electric output for electric generators. The second converts 0.17 lb/mmBtu input to 0.2 lb/mmBtu thermal output for non-electric generators. The nominal allocation rates are simply the heat-input values proposed by EPA, converted to output using typical efficiency factors (10,000 Btu/KWh for electric generators and 80% efficiency for boilers). The actual values do not matter in the end since they are normalized to the available pool. Using these typical efficiency factors, however, reduces the required adjustment.

Each unit receives an allocation equal to its control season output times the appropriate rate. The allocations are then normalized to ensure that the total matches to the pool of allowances available to be allocated. This is the same approach that is used in the heat-input allocation proposed by EPA.

This calculation is made for industrial boilers based on generation of steam or other thermal output. Cogeneration facilities which generate electricity and thermal output would receive allowances from each pool (thermal and electric) based on their output in each category. This can be calculated whether the industrial boiler allowances are done on input or output (see below). Because cogeneration facilities can be in either the EGU or non-EGU pool, they must be accommodated in both sets of allocations.